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A STUDY ON TOTAL ANTIOXIDANT CAPACITY AND OXIDATIVE STRESS IN HYPOTHYROID PATIENTS

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One of the most studied effects of thyroid hormones is the control of the basal metabolic rate which determines the cellular oxidation rate. Reactive oxygen species (ROS) generated during cellular oxidation induces oxidation of proteins, lipids and aryl esterase which may cause abnormalities in their activity. Oxidative stress arises from an imbalance between the production of ROS and reactive nitrogen species (RNS) and the capability of the biological system to readily detoxify reactive intermediates. Protein thiol (-SH) groups are important for the antioxidant defense in the cells. Aryl esterase has the capacity to prevent LDL oxidation. In light of the recent evidence of increased lipid peroxidation in hypothyroid subjects, our present study was designed to measure the total anti oxidant capacity (TAC), protein thiol level and aryl esterase status in hypothyroid patients which are alternate markers of assessing oxidant stress.

Blood samples were collected from 95 hypothyroid patients. Standard laboratory techniques were used to measure TAC, protein thiol, aryl esterase and Thyroid stimulating hormone (TSH). Ethical clearance was obtained from the Ethics committee, Post Graduate Institute of Science.

All the patients had TSH levels $> 5 \mu\text{IU/L}$ indicating a state of hypothyroidism. They were divided into 3 groups having TSH in the range 10-30 $\mu\text{IU/L}$, 30.1-50 $\mu\text{IU/L}$ and $>50 \mu\text{IU/L}$. We have observed that the TAC ($931 \pm 237 \mu\text{mol/L}$) was highest in patients having TSH level $>50 \mu\text{IU/L}$ and lowest ($775 \pm 328 \mu\text{mol/L}$) in the group having TSH level 10-30 $\mu\text{IU/L}$. The difference between the 2 groups was statistically significant ($p < 0.05$).

In this study, TAC was highest in patients with TSH $>50 \mu\text{IU/L}$. This could be due to the reduced metabolic rate expected in hypothyroid patients and thus reduced ROS formation whereby the antioxidant defense system is preserved. In the absence of a reference range for TAC for a Sri Lankan population, the TAC values in the present study was compared with the FRAP values of 612-1634 $\mu\text{mol/L}$ (Mean \pm SD, 1017 ± 206) for healthy Chinese adults. In a previous study, the FRAP values of Sri Lankan first year undergraduate females ranged from 262.2 - 865.6 $\mu\text{mol/L}$ (Mean \pm SD, 528.7 ± 145.6). Hence the TAC values in the 3 groups of patients appear to be normal.

There were no significant changes observed in protein thiol level and aryl esterase activity among the 3 groups of patients indicating similar oxidant stress status. Thus the antioxidant status of hypothyroid patients appears to be unaffected.